SARCLAD

TECHNOLOGY FOR THE METALS INDUSTRY

EDT
Buyer's Guide

Table of Contents

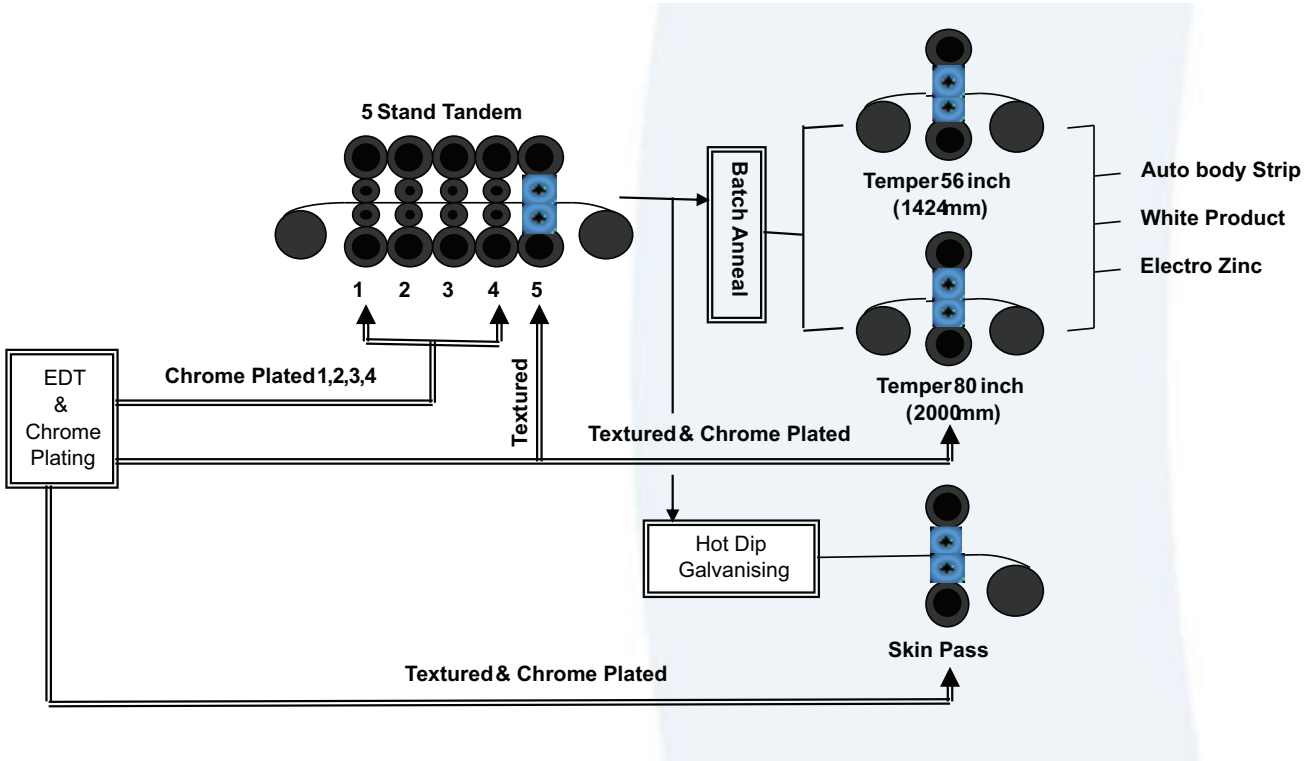
EDT Buyer's Guide

Why does Steel or Aluminium Strip need a surface texture?

Textured rolls are used in the production of metal strip, where the texture is "imprinted" from the roll to the Strip, to provide lubrication for forming and an aesthetic appearance, which is suitable for the highest grade exposed automotive and white goods applications.

What is EDT used for?

EDT in Production of Auto body and strip for domestic white goods:



Textured rolls are commonly employed in the 5th stand of the cold mill and at temper and skin pass mills as indicated by the blue rolls above. Key reasons?

1. To help create tension on the strip for elongation control
2. To aid visual appearance of the textured strip after painting
3. To hold more oil on the strip for the forming of pressed parts.

Roll Texturing Methods

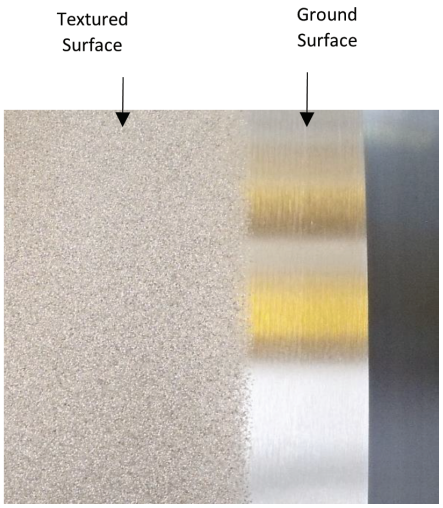
What is Electrical Discharge Texturing (EDT)?

Electrical Discharge Texturing (EDT) is a well-established technology for producing textured rolls for surface critical strip for applications such as Automotive panels. Electrodes are controlled to deliver sparks onto the surface of a cold mill work roll, to produce a precise surface texture.

What is Transfer Ratio?

High forces are used to impart the texture from the work roll on to the metal strip, where typically a transfer ratio of 40% is achieved, the work rolls invariably wear until they are outside of process limits, at which point the rolls are removed from the process line and reground and retextured ready for reuse

The before and after effect of this process can be seen in the image shown in Figure 1. The bright surface on the right is the ground surface and the dull (frosted glass) surface on the left is the textured surface.



What is Shot Blast Texturing (SBT)?

Shot blasting is a basic form of surface texturing that in essence cleans the surface of the metal by “shooting” it with material that is abrasive. The level of abrasiveness used for this particular type of steel surface texturing is dependent on what level of aggressiveness is necessary to get the job done. Typically, shot blast texturing uses grit, cut wire (made of a wide array of different materials such as stainless steel, carbon steel, zinc, and ceramic), as well as shot. The abrasive material is set into the shot blast texturing machine and then shot toward the material that needs to be textured.

Comparison of EDT versus SBT

EDT		SBT
•Electrical Discharge Texturing	**Full Name**	•Shot Blast Texturing
•Local melting by electric spark erosion •(random craters).	**Principle**	•Plastic deformation by granulates (deepening).
•Preferred by the automotive industry. •Best surface appearance for use in exterior car parts.	**Usage in high-quality automotive Industry**	•Can cause the undesirable "Orange-Peel Effect" (increased long-wave portion). •Can cause the undesirable "Grit Effect" (increased short-wave portion). •Therefore, not accepted by automotive industry for car body applications.
•Nowadays the only competitive method in the market.	**Level of technology**	•By far the oldest technology.
•Provides the highest repeatability, accuracy and operation safety. •Extremely precise and controllable roll texture. •High degree of processing flexibility and set-up speed, allowing for the texturing of a wide range of roll sizes and shapes. •Independent of roll hardness, alloy content or roll manufacturer. •Reduced incidence of stickers after batch annealing. •Reduced mill dirt.	**Advantages**	•Low initial investment cost.
•Comparatively higher investment cost.	**Disadvantages**	•No repeatable surface quality. •No uniform surfaces treatment possible.
•Over one hundred and twenty (120) Sarclad machines in the market. •More than 50% of the EDT market globally.	**Current Market Situation**	•Over two-hundred (200) machines worldwide. •Very few new installations only.
•Excellent reference worldwide with many repeat orders. •EDT machines are available in all leading steel plants.	**References**	•Replaced more and more by EDT.
•High industrial standard of automation. •Produces the highest stability of the surface results "roll after roll". •Can be operated in fully automatic mode in an automatic cell (loaded by automatic roll loader). •Data transfer to roll shop management systems (RSMS).	**Degree of Automation**	•Cannot be integrated in a fully automatic roll shop.

What is Laser Texturing (LT)?

Laser texturing is a surface texturing process by which a metal's surface attributes such as roughness and texture are altered via the use of a laser. The laser beam makes micropatterns on the metal's surface via laser ablation. This removes layers with extreme precision and easy repeatability. Laser texturing typically provides surface textures such as grooves, dimples, as well as free forms.

What are stochastic and isotropic surface textures?

For textures to be good enough for high-quality autobody applications they must have 2 characteristics: They must be stochastic and isotropic.

A stochastic surface texture is a type of surface texture that is not going uniformly in the same direction. It is seemingly more random, which allows for things like paint to produce a more consistent appearance over the entire surface.

Isotropic surface texture is a surface texture that measures the same when going in different directions. It is conducive to producing an even surface texture that allows for things like paint to look more consistent.

These characteristics are inherent in the Rolltex EDT texturing process, but not in other methods or roll texturing, such as laser.

Why is EDT the preferred technology for texturing rolls?

Benefit	Explanation
Quality of Texture	Avoids open textures. Over 120 Sarclad units installed globally
High Productivity	Significantly faster texturing speeds than laser which typically takes 10 hours per roll irrespective of Ra versus typically no more than 2.5 hours for Rolltex EDT
Uniformity	The ability to select parameters to give precisely controlled roughness (Ra), peak count (PC) and Skew (RSk)
Reproductibility	The ability to reproduce the required textures on a consistent, day to day basis.
Flexibility	The ability to adjust each individual texturing parameter (speed, current, on/off times & electrode distance from the roll surface) to produce the required range of texture parameters for roughness (Ra), peak count (PC) and Skew (Rsk).

The reason that EDT is preferred over the uniformity of laser produced surface texturing on a steel sheet is that when the metal is painted, the panels would look as though they are different shades. As a result, this would make things like cars look like they have been given an unprofessional paint job.

Surface Texture

Ra

Surface roughness is the aspect of a surface texture that is measured for the purposes of determining how much friction a piece steel sheet will produce. It is calculated by measuring the average surface heights and depths across an object's surface. Surface roughness is typically shown as "Ra", which is an abbreviation for "Roughness Average".

Rpc

Peak count (Rpc) is a term that is defined as the number of roughness profile peaks that are present per a unit length that rise above a line that has been predetermined.

Ra is oriented around average peak height of a steel sheet, whereas Rpc is oriented around how many peaks there are. Ra can show the overall average height of what peaks there are in a texture.

A higher peak count not only helps more paint to stick to the surface of a steel sheet, but it also helps in providing a more even coating. The fewer the peaks, the more uneven the painted surface will be.

High peak count can be attained through the use of EDT machines, such as the Sarclad Rolltex EDT. Other methods such as laser texturing are not able to provide as high of a peak count, as every texture created from such means is too flat, creates fewer peaks, and all goes in one direction.

Waviness

Waviness refers to surfaces in steel roll sheets that occasionally appear at longer intervals than the roughness of the sheet's surface texture. These uneven surfaces are considered to be a deviation from what is considered to be an ideal surface which appears repeatedly at somewhat longer intervals than the depth.

Waviness is important to watch out for because it adds on extra shine to steel sheet metal roll textures which also shows a lack of smoothness. Furthermore, the texture does not fully cover the roll's surface.

Waviness can be measured through a variety of different instruments, which include both roundness instruments as well as finish profilometers. Many of these instruments are now stylus-based contact tools in addition to optical and laser-based non-contact tools.

Waviness can be reduced via the Sarclad Rolltex EDT-MSA, which is able to provide operators with higher Rpc, tighter consistency, better roll shape to remove any defects, and an increase in speed and roll texturing capacity.

Skew

Skew is the measurement of the symmetry of the profile about the mean line of the steel sheet texture. It will distinguish between asymmetrical profiles of the same roughness (Ra).

The main effect that skew has on the rolling process is that it can alter the sheet's deformation texture. The right kind of polishing process can lower the initial roughness drop, extend the life of the roll's texture, reduce problems with pick-up or debris, and overall better strip performance.

Measurement

There are numerous texture measurement aspects used throughout the industry. These include roughness (Ra), peak count (RPc), waviness, as well as skew (Rsk).

Surface texture can be measured on rolls via Sarclad's quick and accurate measurement system, Rollscan. This can be placed onto roll grinding equipment to be used during and after roll grinding activities to effectively detect and quantify surface defects such as roll cracks, bruising and magnetism, as well as sub-surface flaws such as shell core interface defects, non-metallic inclusions and porosity.

Rolltex EDT (MSV)

What Kinds of Texturing Capabilities Does Rolltex Have?

Sarclad provides an unrivalled choice of EDT units to select from, ensuring that a close match can be offered to any customers requirement in terms of textured roll capacity, textured quality requirement and budget can be found.

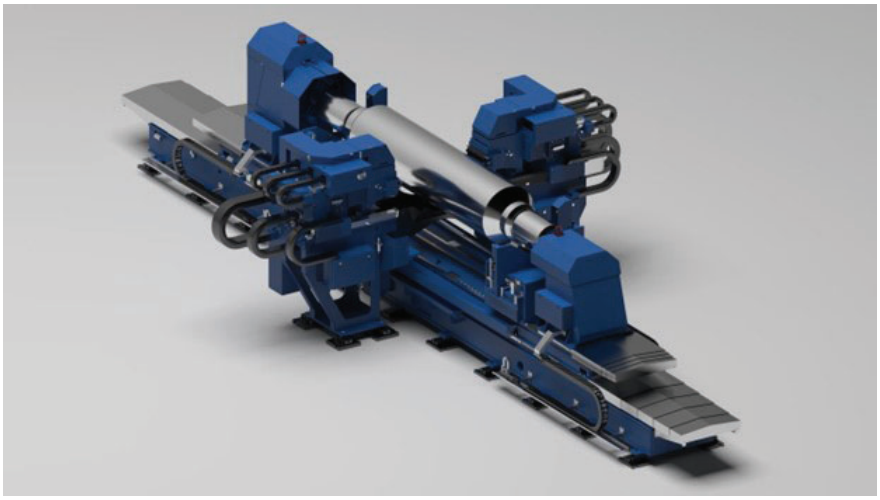
What Rolltex EDT Variants are Available?

Multi-Servo Array (MSA)

The Rolltex EDT Multi-Servo Array was launched in 2022 and provides the highest quality texture available on the market. It features a unique array of individually servo-controlled electrodes which generate a texturing efficiency rate of 99%. This step change in efficiency can be channeled to deliver increases in peak count performance, texture consistency and speed. It can also be applied to remove roll surface defects such as water marks or oil.

Moving Roll Variant (MRV)

The roll is traversed along the bed of the EDT by the roll manipulator. The texture head remains static .



Moving Saddle Variant (MSV)

The roll stays static and the texture head and saddle traverse along the length of the roll .

How Many Electrodes Do You Need?

This will be dependent upon several factors, in particular the roll dimensions and roughness required. The lower the Ra required, the longer the roll will take to be textured. Sarclad can work this out precisely for you with the above information provided.

As an indication a 12-electrode EDT machine will typically be able to texture 1200 rolls per year whilst a 72-electrode machine will be able to texture up to 8000 rolls per year. The MSA launched in July 2022 is able to provide capacity

ROLLTEX	Target Market	No. of Electrodes	Why Select?
Multi-Servo Array	Automotive external panels / Aerospace etc	12, 36, 72	Highest Quality texture on the market required Looking to buy 1 EDT to replace 2 older machines
Moving Roll Variant	Typical mill range (Construction / Packaging / Consumer Goods / Auto applications	12, 24, 36,72	Sarclad have confirmed my textured roll requirements can be satisfied Budget is a factor
Moving Saddle Variant	Typical mill range (Construction / Packaging / Consumer Goods / Auto applications	12,24, 36, 72	
ECO	Aluminium / small steel mills	12	

The Rolltex EDT machine from Sarclad provides operators with integrated automatic roll loaders as well as roll shop management software with texturing capabilities of up to +1,000 rolls each month when 72 electrodes are used. When 36 are used, the Rolltex is able to provide you with up to 600 rolls each month. Should you need low roll volume texturing, the Rolltex EDT from Sarclad is able to offer you anywhere from 100-300 rolls per month. The fully automated MSV can give you 300 rolls, whereas the Eco (semi-automated) model is able to produce 100 rolls. Additionally, the Rolltex Eco EDT when used for aluminum as well as low volume steel strip production, can offer you up to 1,000 rolls on a yearly basis. Furthermore, the Sarclad Rolltex EDT is available with integration with RSMS or automatic roll loaders.

What Kind of Maintenance Does an EDT Machine Need?

When your Rolltex EDT machine is in need of any sort of maintenance or repairs, Sarclad is here to provide you with the assistance you need. We offer a number of different services to help you in such situations, such as:

- On site assistance
- Emergency call outs
- Remote support
- Emergency breakdown support
- Supply of spares and consumables
- Through life product support in addition to upgrades and various improvement options
- Technical support for any special requirements or product development

Why Should I Buy from Sarclad?

Sarclad has been manufacturing Rolltex EDT machines for the steel manufacturing industry for over 35 years. Our knowledge and experience of EDT design and production is unmatched by any of our competitors worldwide. Rolltex EDT machines are used by a wide variety of different companies, like Temper, Tandem, Skin Pass, Sendzimir, specialty strip producers, as well as reversing mills. Plus, the Rolltex EDT is able to provide the right surface textures for major automotive companies.

What Support Does Sarclad Provide?

From our international offices located throughout the world in the USA, UK, India, as well as China, and provided support by our wide network of agents who are regionally native to their areas, Sarclad is able to offer 24-hour coverage worldwide and support for any and all service as well as after-sales requirements.